

Volunteer Angler Aquatic Invasive Species Monitoring Pilot Program

Nova Scotia Freshwater Fisheries Research Cooperative, Final Reporting

Prepared by Rachel Walsh (rachelwalsh@annapolisriver.ca)

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INTRODUCTION

In response to the introduction and continuous spread of aquatic invasive species (AIS) (i.e. chain pickerel, smallmouth bass) in Nova Scotia, and the resultant threat to sport fisheries and aquatic species at risk, Clean Annapolis River Project (CARP) has initiated the development and piloting of a citizen science angling program that allows for ongoing monitoring and potential early detection of aquatic invasive species in lakes, rivers, and streams across the province.

Project Goals & Objectives

The primary goal of “Volunteer Angler Aquatic Invasive Species Monitoring Pilot Program” is to develop and trial a standardized citizen-science protocol that can be applied by volunteer anglers throughout Nova Scotia, supporting informed and timely fisheries management actions by filling spatial data gaps and contributing to the early detection of AIS.

In addition, the pilot program will promote awareness and knowledge of AIS, contributing factors to their spread, and their impacts on native species including species at risk populations (i.e. Atlantic salmon, Atlantic whitefish) in Nova Scotia. The increased knowledge and awareness among the angling population gained through the program is hoped to lead to a

reduction in the spread of AIS through deliberate introductions by anglers, and unintentional introductions through transportation and release of baitfish between systems.

Initial program material development commenced in early 2020, and the pilot program launched in 2020. A second year of the pilot is anticipated for the 2021 fishing season. Each volunteer is asked to visit the same site(s) on a repeated basis; this means visiting multiple times each fishing season, and visiting the same site each year. Anglers are to record and report on species caught/observed and provide reports to the program coordinator at the end of the season.

For the initial pilot year of the program, specific objectives included the establishment of a group of engaged and trained volunteer anglers, and the collection and analysis of data that helps to increase knowledge about AIS habitat use and spread in NS.

CITIZEN SCIENCE PROGRAM DEVELOPMENT

A citizen science protocol and supporting materials were developed in the early winter and spring of 2020. Documents developed to support the program include: stepwise program instructions, tips for taking fish measurements, reporting guidelines for both aquatic invasive species and species at risk, and instructions for post-angling season data submission.

Registered volunteers received a package of additional, materials, including:

- Angler diary (Appendix 1)
- Program information booklet (Appendix 2)
- Volunteer waiver form (Appendix 3)
- Fish identification card (Appendix 4)
- Drop-off locations sheet (Appendix 5)
- Protocol sheet (Appendix 6)
- Clipboard
- AIS fish measuring data sheet (Appendix 7)
- Weekly data sheet (Appendix 8)

In addition to recording and submitting catch data using paper diaries, volunteers were encouraged to submit observations using iNaturalist, a digital citizen science tool that allows individuals to document wildlife and connects users to a community that can assist with species identification. Resources on the use of iNaturalist were provided to volunteers.

A grid mapping system for selecting fishing locations was developed as part of program development. The purpose of this grid is to allow for the comparison of data between years of the program. A 500 metre x 500 metre grid was overlaid on a map of Nova Scotia, and clipped to remove any areas that included only ocean (e.g. no coastline within grid). To determine the grid reference for angling areas, volunteers first select the Recreational Fishing Area in which they plan to angle. This will launch a more detailed map in which grid codes are displayed.

Anglers must then zoom to the precise area being targeted, and record the appropriate grid code(s). Codes consist of a sequence of 7 numbers and digits, with the first number indicating the Recreational Fishing Area. Maps were hosted on the CARP website to facilitate volunteer selection of fishing areas for the year 1 pilot.

An online training module was developed for prospective volunteers using Survey Monkey. Training was only delivered online as a result of COVID-19. Effectiveness of training and comprehension of the background materials was evaluated through an online quiz. The quiz included a series of questions related to fishing regulations, species at risk, aquatic invasive species, proper catch and release techniques, and methods for data collection and submission. The quiz was designed to help ensure CARP and project partners that prospective volunteers are aware of the expectations for participation in the monitoring program, and that the angler has background information they can use to educate other anglers or members of the public when the opportunity arises.

PILOT PROGRAM YEAR 1 RESULTS

The volunteer monitoring program was advertised through social media posts by CARP and project partners, including M'ikmaw Conservation Group, Mersey Tobeatic Research Institute, and Coastal Action, as well as through word of mouth. As a result, 60 anglers registered for the citizen science monitoring program. However, of those 60 participants, only 26 completed the online training and quiz associated with the program. Angler Kits containing the protocol and other supporting materials were distributed to each volunteer who completed training. Participants received materials digitally or in hard copy via mail, depending on their preference.

As the 2020 fishing season began to wrap up, participants received phone and email reminders with steps on how to submit their angler diaries. Once anglers submitted their diary back to CARP, they were sent a thank-you letter with an endangered species patch of their choice, as well as asked to fill out an evaluation survey for the program. A summary of the survey results can be found in Appendix 9.

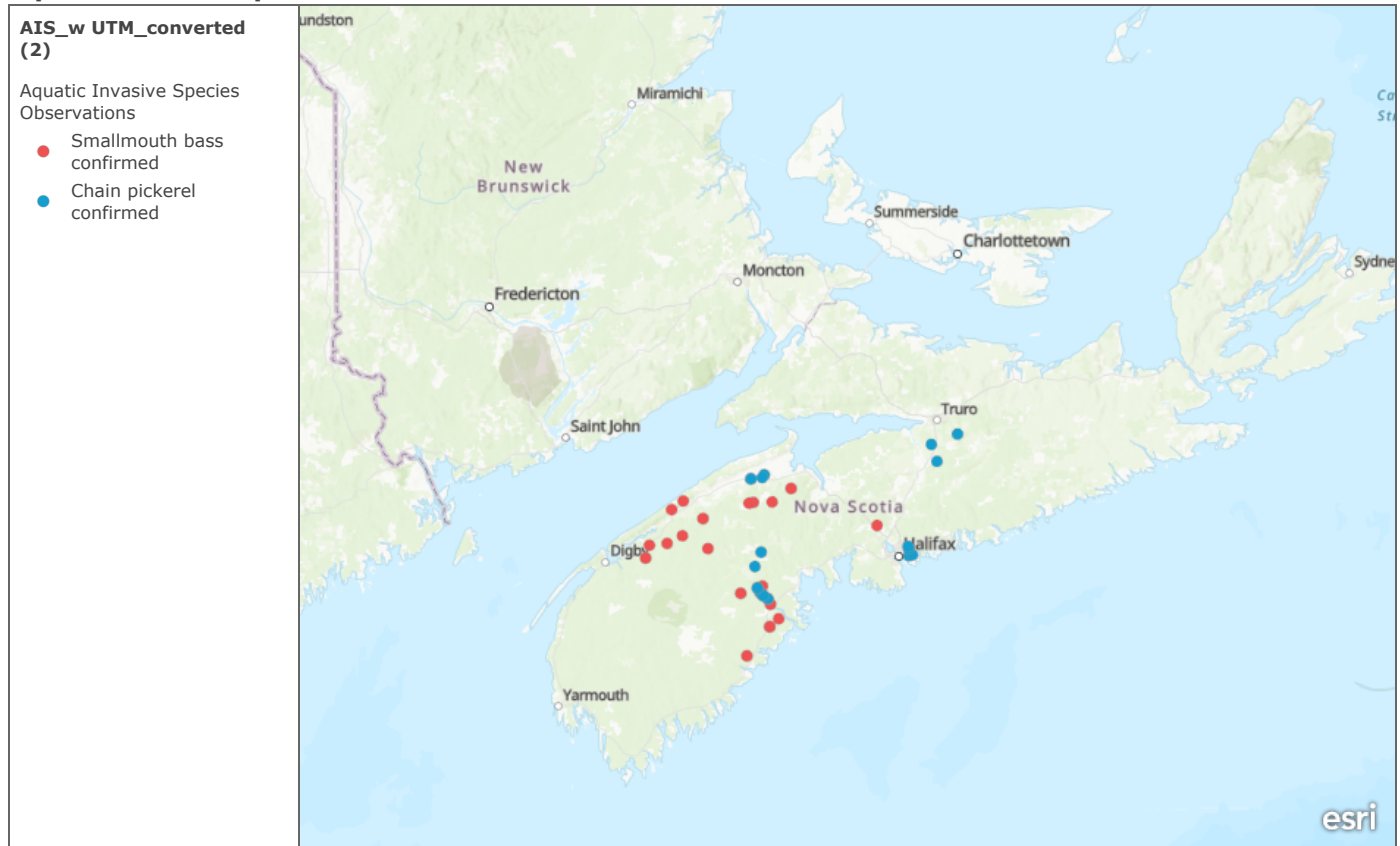
Data submitted through the diaries was compiled into a spreadsheet containing all angler catches and observations (Appendix 10). Aquatic invasive species observations from anglers, as well as observations from angler surveys, and additional field sampling done by CARP and existing project partners was uploaded and used to create an online map showing both chain pickerel and smallmouth bass observations for the 2020 fishing season. The map can be found at <<https://www.arcgis.com/home/webmap/viewer.html?webmap=9c8f5aab23e04a74be039f4bdd0066d5>>.

Summary of results from the pilot year 1:

- 26 anglers registered for Citizen Science Volunteer Angling Program

- 5 angler diaries were received at the end of fishing season, resulting in:
 - 148 volunteer angling hours
 - 31 Grids surveyed
 - 10 systems fished:
 - Herbert River
 - Cornwallis River (AIS)
 - Mersey River (AIS)
 - Gaspereau River
 - Fales River
 - Annapolis River
 - St. Croix River
 - Gaspereau Lake (AIS)
 - Seven Mile Lake (AIS)
 - Herring Cove Lake (AIS)
 - 11 species caught, including 2 aquatic invasive species and 3 species at risk
 - Brook Trout
 - Brown Trout
 - Rainbow Trout
 - American Shad
 - White Sucker
 - Yellow Perch
 - Smallmouth Bass (AIS)
 - Chain Pickerel (AIS)
 - Atlantic Salmon (SAR)
 - Striped Bass (SAR)
 - American Eel (SAR)

Aquatic Invasive Species Observations 2020



Smallmouth bass and chain pickerel observations

CHALLENGES & RECOMMENDATIONS FOR THE FUTURE

Throughout the 2020 season of the volunteer angling program, a number of challenges and barriers were faced. Covid-19 resulted in a number of challenges to launching the program. In March 2020 CARP staff moved to a work-from home policy in response to public health guidelines, creating challenges in finalizing program materials. Restrictions on travel and public engagement, including the cancellation of many derbies and tournaments, limited the anticipated opportunities for in-person recruitment of volunteer anglers. Registration, training, and communication with anglers largely took place on an online platform or by phone. The lack of in-person events and meetings made it difficult to reach out and communicate to anglers, and keep them engaged in the program. When it came time for the submission of angler diaries, there was a relatively low response rate. A series of emails and phone call reminders were sent out with steps for submission, but unfortunately only 5 of the 26 participants submitted data. In some cases anglers responded indicating that they did not have data to submit, as they were unable to spend time angling during the 2020 season.

Based on the feedback from the program evaluation survey, iNaturalist is not a platform that seems likely to have major uptake from anglers. Additionally, iNaturalist has several limitations in the type of data it is able to collect, and cannot serve as a substitute method to submit catch data (e.g. no field for recording length, angling method, bait, etc.). It is recommended that the program be modified to promote the digital submission of catch data throughout the angling season using the MyCatch app, which is connected to the Anglers Atlas platform. The mission of Anglers Atlas is to create an online resource centre for anglers by providing detailed maps and related local content for their members. As an angler oriented company, Anglers Atlas commits to protecting sensitive data, such as personal angling locations. MyCatch is an app that allows citizen scientists to contribute data directly to fisheries biologists and researchers using a smartphone. The app was developed by an advisory group of fisheries management biologists and researchers, with a goal to develop more accurate stock assessments using both traditional research methods, and citizen scientists' fishing logs. The app collects similar information to the angler diary, such as date, time, species caught, measurements etc. The app allows anglers to enter their data in real time, rather than compiling paper copies to be submitted at the end of the season. Paper copies of the angler diary will still be available for use, and anglers will have the option to submit and record observations using paper copies of the angler diary, or entering it through the MyCatch app. It is hoped that this approach will increase the amount of data submitted through the program, and may help retain anglers who are more technologically savvy. While specific location data is protected on the public side of the Anglers Atlas platform, as a conservation and research partner, CARP will be able to download specific catch data, and has initiated discussions that will help to inform the development of a data sharing agreement. Additionally, work in partnership with the Anglers

Atlas team commenced in Spring 2021 to identify potential modification to the platform that may improve its use for the citizen science monitoring program.

Several additional modifications the program are recommended prior to the year 2 pilot, including:

- More continual contact throughout the angling season to improve retention and increase data submission. This will include requests for angler photos to share via social media to generate excitement about the program.
- Ongoing updates to the publicly accessible AIS observation map, as a way to show volunteer anglers how their data is helping to generate knowledge about AIS distribution in Nova Scotia.
- Transfer of the training quiz to Google Sheets from Survey Monkey to improve ease of use, and the addition of an answer prompt for any questions that are answered incorrectly, to improve learning outcomes.
- Updates to the protocol to reflect use of Anglers Atlas/MyCatch and removal of references to iNaturalist.
- Modified format for the paper diary to improve ease of use, to eliminate redundancies in data fields, and to incorporate measuring guidelines into the diary, instead of providing a separate resource page.
- The addition of a data field for specific coordinates for each catch in the paper angler diary.
- Elimination of the weekly data summary sheet, as this sheet went unused in year 1 and is redundant in the case that observations are otherwise submitted.
- Removal of the request for volunteers to identify the grid references for their planned fishing areas. Instead the project leader will use the location data provided by the angler (Lat/Long, UTM, google map point, etc.) to determine the grid reference on their behalf. This modification is hoped to eliminate potential confusion and ease the registration process.

Appendices

Appendix 1, Angler Diary (sample page)

2020 Angler Diary Effort Card

Date	Start time	End time	Water Fished	Hours Fished	Target Species	Tackle used	Fishing method	Water temp	# of fish killed	Species of fish killed
15/05/2020	13:30	14:30	Fales River	1	CP, SMB	LB	W	19°C	0	N/A
Chain Pickerel (AIS)	Smallmouth Bass (AIS)	Trout sp. _____	Atlantic Salmon (SAR)	Atlantic Whitefish (SAR)	Perch sp. <u>White Perch</u>	Note (LB): <u>Minnow</u>	Other sp. _____	Other: _____	Other: _____	Total Species
5	1	0	0	0	1	N/A	0	0	0	0
Date	Start time	End time	Water Fished	Hours Fished	Target Species	Tackle used	Fishing method	Water temp	# of fish killed	Species of fish killed
Chain Pickerel (AIS)	Smallmouth Bass (AIS)	Trout sp. _____	Atlantic Salmon (SAR)	Atlantic Whitefish (SAR)	Perch sp. _____	Note (LB): _____ N/A	Other: _____	Other: _____	Other: _____	Total Species
Date	Start time	End time	Water Fished	Hours Fished	Target Species	Tackle used	Fishing method	Water temp	# of fish killed	Species of fish killed
Chain Pickerel (AIS)	Smallmouth Bass (AIS)	Trout sp. _____	Atlantic Salmon (SAR)	Atlantic Whitefish (SAR)	Perch sp. _____	Note (LB): _____ N/A	Other: _____	Other: _____	Other: _____	Total Species
Date	Start time	End time	Water Fished	Hours Fished	Target Species	Tackle used	Fishing method	Water temp	# of fish killed	Species of fish killed
Chain Pickerel (AIS)	Smallmouth Bass (AIS)	Trout sp. _____	Atlantic Salmon (SAR)	Atlantic Whitefish (SAR)	Perch sp. _____	Note (LB): _____ N/A	Other: _____	Other: _____	Other: _____	Total Species

Fishing tackle used:

Fly (F) Barbed hook (B) Artificial lure (AL)
 Live bait (LB) Barbless hook (NB)

Fishing method:

Shore (S) Wading (W) Canoe/Boat (C/B)

Appendix 2, Program Information Booklet

PROPER CATCH AND RELEASE TECHNIQUES

- Using artificial flies and lures increases the chances of survival. Live bait is often swallowed deeply which increases the risk of injury to the fish. Cut the line if a hook is swallowed deeply, the fish will work the hook out with time.
- Using circle hooks or barbless hooks can reduce harm to released fish.
- Do not play a fish until exhaustion.
- Keep air exposure to a minimum. Avoid beaching a fish as this will remove the protective slime and can lead to infection later.
- Do not lift the fish out of the water by the tail. This can damage the spine of the fish.
- Avoid squeezing the fish between the pectoral (chest) fins, this is where the heart is situated.
- Do not touch the gills and avoid placing fingers under the gill plate.

Source: Inland Fisheries Division, Department of Fisheries and Aquaculture

Thanks to our project partners:



This project was undertaken with the financial support of the Government of Canada.



Invasive Species in Nova Scotia

Smallmouth bass and chain pickerel are two non-native, invasive species that have serious negative impacts on native fish communities once introduced into a water system. Smallmouth bass and chain pickerel are direct predators of native fish, and create competition for food and habitat. In water courses where smallmouth bass or chain pickerel have been introduced, observed impacts include decreased species richness and diversity, and declining populations of native species such as Atlantic salmon, Atlantic whitefish, etc.

INVASIVE SPECIES:

- Reduce number of native fish
- Reduce number of popular sport fish
- Once established, are difficult, if not impossible to control

INVASIVE SPECIES

1



1. Chain Pickerel (*Esox niger*)

2



2. Smallmouth Bass (*Micropterus dolomieu*)



INFO PACKAGE

Fish Monitoring Program

A citizen science program for anglers who find themselves in Central and Western Nova Scotia.

The Clean Annapolis River Project (CARP), and project partners have developed a volunteer based, citizen science angling program that will allow for ongoing monitoring and potential early detection of aquatic invasive species (AIS). The program will run from 2019-2021.

Each volunteer is asked to record and report on species caught/observed and provide reports to the program coordinator at the end of the season.

In the case the AIS are detected, this information will immediately be reported to NS Fisheries and Aquaculture.



The Clean Annapolis River Project (CARP) is a charitable, community-based, non-governmental organization that was incorporated in the 1990's. CARP's mission is to enhance the ecological health of the Annapolis River watershed for current and future generations through science, leadership and community engagement.

Visit the following link to view a copy of the 2020 Anglers Handbook for more information on fishing dates (season), bag limits, and regulations:

<https://novascotia.ca/fish/documents/Anglers-Handbook-2020.pdf>

HOW TO PREVENT THE SPREAD OF INVASIVE SPECIES

- Inspect your boat, motor, trailer, and boating equipment such as anchors and fishing gear, centerboards, rollers, and axles. Remove any animals and plants that are visible before leaving any waterbody.
- Drain water from the motor, live well, bilge and transom wells while on land immediately before leaving the waterbody. Wash or dry your boots, waders, boat, tackle, trailer, and other boating equipment to kill harmful species that were not visible.
- Do not release or transport live bait, and become familiar with AIS in Nova Scotia.
- Some aquatic species can survive more than two weeks out of water. Therefore, it is important to do the following to any gear, waders, and boats:

Rinse with hot water,

Spray with high pressure water (250 psi),

Dry your boat and gear in the sun for at least 5 days before transporting them to another body of water.



Invasive Chain pickerel (NS Fisheries & Aquaculture)
Photo source: <https://novascotia.ca/fish/sportfishing/faa/>

Appendix 3, Volunteer Waiver Form



RELEASE OF LIABILITY, WAIVER OF CLAIMS, ASSUMPTIONS OF RISKS AND INDEMNITY AGREEMENT:

VOLUNTEER CITIZEN SCIENCE FISH PROGRAM

Date: _____

Organization: Clean Annapolis River Project

Angler/Volunteer: _____

Address of Volunteer: _____

To: Clean Annapolis River Project

ASSUMPTION OF RISKS

I am aware that participating in the CARP Volunteer Fish Program as a volunteer angler along watercourses (the "Program") with easy or more remote access involves inherent risks, dangers, and hazards, including but not limited to:

- 1. *Bodily injury due to mishaps while angling in and near water*
- 2. *Risks from exposure to weather and climatic conditions such a heat, cold, rain, lightning*
- 3. *Potential encounters with wild animals and biting insects*

I accept and fully assume all such risks, dangers, regulations and hazards and the possibility of personal injury, death, and loss of gear resulting therefrom.

RELEASE OF LIABILITY, WAIVER OF CLAIMS AND INDEMNITY AGREEMENT

In consideration of approval to participate in the program, I agree as follows:

1. To waive any and all claims that I have or may in the future have against the Clean Annapolis River Project, and their employees, volunteers and funding agencies (hereinafter collectively referred to as "THE RELEASEES"), and TO RELEASE THE RELEASEES jointly and severally, of and from any and all liability for any losses, damages, expenses and claims arising out of or in connection with injury (including death) or damage to property that I may suffer, or that my next of kin may suffer as a result of my participation in the Program due to any cause whatsoever INCLUDING NEGLIGENCE, BREACH OF CONTRACT, OR BREACH OF ANY STATUTORY OR OTHER DUTY OF CARE.

Waiver - Volunteer Fish Program

Fish Species in Nova Scotia



White Perch



Yellow Perch



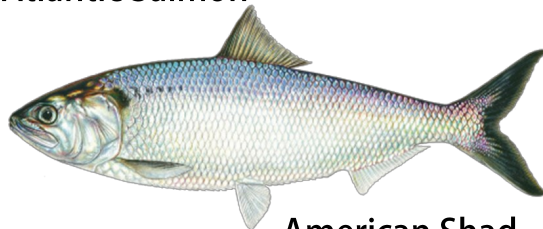
Brook or Speckled Trout



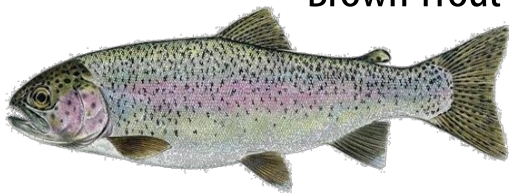
Atlantic Salmon



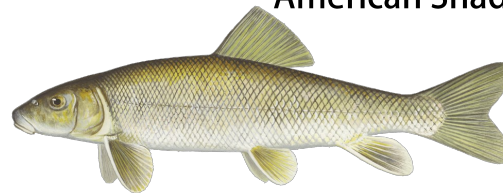
Brown Trout



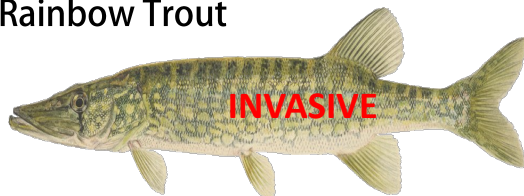
American Shad



Rainbow Trout



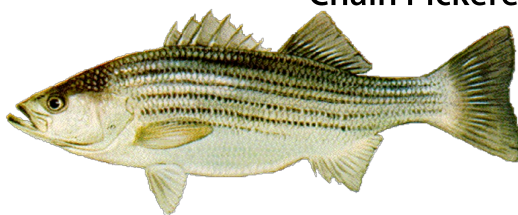
White Sucker



Chain Pickerel



Smallmouth Bass



Striped Bass



Brown Bullhead

Appendix 5, Drop-off Locations Sheet

Other drop-off locations include:

(1) Coastal Action



45 School St, Suite 403,
Mahone Bay, NS, B0J 2E0.
Tel: 902-634-9977 | Fax: 902-634-9979

Project Lead: **Shawn Feener**, email: shawn@coastalaction.org

(2) Mi'kmaw Conservation Group



57 Martin Crescent, Millbrook Mi'kmaw Community
PO Box 1590, Truro NS, B2N 5V3
Tel. 902.895.6385 ext. 291 | Fax. 902.893.1520

Project Lead: **Jillian Arany**, email: JArany@mikmawconservation.ca

(3) Mersey Tobeatic Research Institute



9 Mount Merritt Road
PO Box 215, Kempt, Queens County
Nova Scotia, Canada, B0T 1B0
Tel: 902-682-2371 (phone), 902-682-2760 (fax)

Project Contact: **Thomas Sweeney**, email: thomas.sweeney@merseytobeatic.ca



Welcome to CARP's Citizen Science Fish Monitoring Program!

OBJECTIVE

The objective of the program includes monitoring of fish and potential early detection of aquatic invasive species (AIS) at an assigned site, on an ongoing basis. This will allow us to determine where AIS are in Nova Scotia, along with species at risk, and other fish species. In the case that AIS are detected, it will be reported immediately to NS Fisheries and Aquaculture.



Photo credit: J. Trimm

MATERIALS

Included materials:

- Angler diaries + info booklet
- Incident report form
- Volunteer waiver form
- Fish identification card
- Drop-off locations sheet
- Protocol sheet
- Clipboard
- AIS fish measuring data sheet
- Weekly data sheet

Additional required materials:

- Angling rod and tackle
- Fishing license
- Boat/canoe (optional)
- PFD (for boat/canoe use)
- Cooler (for dead fish)
- Ice for cooler (if out for extended periods of time)

- Fish club (*optional*)
- String to measure fish
- Pencil or pen (for data recording)
- Measuring tape
- *GPS or compass for navigation (if needed)*
- Scale for fish
- First aid kit and throw rope
- Hip or chest waders (*optional*)
- Bailer (for canoe and boat use)

INSTRUCTIONS

Preparing for angling surveys

- Please sign and return the volunteer waiver form to the Clean Annapolis River Project
(*Please note: you will be participating in the Fish Monitoring Citizen Science Program at your own risk*)
- Complete the online training materials and quiz provided online to you (if you have not received these materials, contact Sam at: samanthahudson@annapolisriver.ca)
- Choose the area/ system (grid) that you will want to fish on an ongoing basis
(*Things to consider: easy access, close to home, a known fishing area that you are familiar with, etc.*). You can do this through CARP's website AIS page here: <https://www.annapolisriver.ca/ais>.
- Make sure you have purchased a fishing license for the season you are angling within!
- If you are fishing in National Parks (ie: Kejimikujik National Park, Cape Breton Highlands National Park), a *National Parks Fishing Permit* (license) is required. To learn more visit:

Kejimikujik National Park and National Historic Site:

<https://www.pc.gc.ca/en/pn-np/ns/kejimikujik/activ/peche-fishing>

Cape Breton Highlands National Park:

<https://www.pc.gc.ca/en/pn-np/ns/cbreton/activ/peche-fishing>

INSTRUCTIONS continued...

- Be aware of any safety concerns and make sure you are familiar with the area(s) where you will be angling (nearby wildlife, weather conditions, environmental hazards, ticks and mosquitos, etc.), along with having a first aid kit on site.
- Once per week (or as time permits and allows) fish within your assigned site (grid), making sure to fill out the angler diary and any observations
- Do not worry if you don't find any aquatic invasive species (AIS)! It is important to keep in mind that not seeing AIS is a good thing; this data will give us an idea of where AIS currently exist in the province (expanding on what is currently known)
- Become familiar with fishing regulations for Nova Scotia (can be found in Angler's Handbook when purchase a fishing license, or online here: <https://novascotia.ca/fish/documents/Anglers-Handbook-2019.pdf>). Keep in mind that National Parks have their own fishing regulations which can be found in the links provided above.

*And most importantly - **fish and have fun!***

Aquatic Invasive Species

In the event **that you do detect aquatic invasive species** (eg: Chain pickerel, smallmouth bass), please contact CARP and NS Fisheries and Aquaculture immediately.

NS Inland Fisheries:

Phone: 902-485-5056 Email: inland@novascotia.ca

CARP Contact Info:

Phone: 902-532-7533 Email: samanthahudson@annapolisriver.ca

Fisheries and Oceans Canada

Nova Scotia

Toll-free: 1-888-435-4040

Email: XMARinvasive@dfo-mpo.gc.ca

It is important to also include the following information with your reporting(s):

- Species
- Date
- Location (GPS pt. if available – this can also be obtained from the compass app if using an iPhone)
- Photo(s)



Chain pickerel (*Esox niger*)

Photo credit: J. Trimm



Smallmouth bass (*Micropterus dolomieu*)

Photo credit: J. Trimm

Fish measurements for aquatic invasive species

Aquatic invasive species are rapidly spreading into new territory throughout Nova Scotia. In order to better understand the health of the population of chain pickerel and smallmouth bass – both aquatic invasive species in NS waters, the Clean Annapolis River Project is asking anglers under the CARP Fish Monitoring Program to record basic measurements of each species of **chain pickerel and smallmouth bass** that is caught.

*please note, measurements of chain pickerel and smallmouth bass are not required but are encouraged if the angler is willing and able to do so. If additional materials or measuring gear is required and not available to the angler, please contact the Clean Annapolis River Project to arrange delivery.

How to measure a fish

The following instructions and images demonstrate how to properly measure a fish, along with things anglers should consider. Measuring a live fish can be difficult, so make sure you are firmly holding the fish so it does not return to the water.

One of the easiest ways to measure a fish is using a fish measuring board (see photo below), but a tape measure will also work just fine! Fish boards are very easy to make – if you are interested in making your own fish board, please reach out to us.

CARP is asking anglers to record the following measurements and information:

- Fork length
- Girth (see next page for details)
- Weight (optional if angler has a scale)

1. Measuring fork length



Fork length

Measure to the point where the tail fin separates – where the tail fin branches off into 2 separate points.

Using the fish board, as pictured, this fish can be measured as approximately **20.9cm fork length**.

Questions? Contact us!

4. Measuring the girth

Wrap a fabric ruler around the fattest part of the fish to find the girth. If a fabric ruler is not available, you may also use a piece of string and measure the length of the string afterwards using a tape measure.

You should be able to determine the fattest part of the fish by looking at the fish and observing which part of the fish sticks out the most on both sides. You should do this while looking down the fishes back.

Responding to **aquatic species at risk** observations and catches

If you catch an **Atlantic whitefish** or **Inner Bay of Fundy Salmon**, release it immediately in the location of capture with the least amount of harm possible and report your sightings. Please see **page 8** for more information. Please report your sightings (information follows), along with including the necessary information mentioned on page 4 with your reporting's.

Fisheries and Oceans Canada:

Please report any sightings of **Atlantic whitefish** to Fisheries and Oceans Canada at **902-354-6030**.

Please report any sightings of **Atlantic salmon (all populations)** to Fisheries and Oceans Canada at **902-237-3682** or email Dustin Raab at: DFO.MAR.Salmon-Saumon.MAR.MPO@dfo-mpo.gc.ca.

NS Inland Fisheries (contact info page 4)

Clean Annapolis River Project (contact info on page 4)



Atlantic whitefish (*Coregonus huntsmani*)
Image Source: <http://www.hww.ca/en/wildlife/fish-amphibians-and-reptiles/atlantic-whitefish.html>



Atlantic salmon (*Salmo salar*) – Inner Bay of Fundy
Photo Credit: Sam Hudson, Clean Annapolis River Project

Note: Your angler kit includes an **Aquatic Species at Risk Incident Report Form**. If you are to find aquatic species at risk, such as Atlantic salmon or Atlantic whitefish, dead or in distress (eg: on a bank or alongside a river), please fill out this form and immediately call one of the contacts provided.

CANADA'S AQUATIC SPECIES AT RISK

Canada's Species at Risk Act (SARA), created in 2003 to prevent Canadian wildlife species from becoming extinct, includes prohibitions that make it illegal to kill, harm, harass, capture or take a species listed as endangered or threatened under SARA or to destroy their critical habitat.

In Nova Scotia, the inner Bay of Fundy Atlantic salmon and the Atlantic whitefish are listed as endangered and protected under SARA. It is important that anglers do not catch or retain either of these species.

Inner Bay of Fundy Atlantic salmon:

This population occupies rivers that empty into the upper Bay of Fundy (blue area on map). The main characteristic that identifies the difference between an Atlantic salmon and a Brown trout are shown below. Other differences are found on page 61.



Atlantic Salmon



Brown Trout (mouth extends beyond eye)

Illustrations by: J. O. Pennanen/Atlantic Salmon Federation®



Atlantic whitefish

Atlantic whitefish: The Petite Rivière Watershed in Lunenburg County (red area on map) is home to the only known population of Atlantic whitefish. Atlantic whitefish differ from the more common Lake whitefish in that the Atlantic whitefish jaw extends to its snout, has a smaller pectoral fin ray and smaller scales than the Lake whitefish.

Please report any sightings of Atlantic whitefish to Fisheries and Oceans Canada at 902-354-6030.

If you catch an Atlantic whitefish or Inner Bay of Fundy Salmon, release it immediately in the location of capture with the least amount of harm possible.

TO REPORT A FISHING VIOLATION, CALL 1-800-565-1633; OR, REPORT ANONYMOUSLY TO NS CRIME STOPPERS AT 1-800-222-TIPS (8477).

For more information / Pour obtenir plus de renseignements
www.sararegistry.gc.ca or www.dfo-mpo.gc.ca/species-especes/

Canada

After the first angling season (2020)

- Submit your sightings to iNaturalist! If you do not wish to create an iNaturalist account, you may give CARP permission to submit observations on your behalf.
- Submit your angler diaries (at any point during the angling season) to a drop off location nearest to you (see sheet 'Other drop-off locations' included in this package). You can also mail your angler diaries to the **Clean Annapolis River Project** (mailing information provided on angler diary)
- After you submit your angler diary, you will receive your choice of a fishing badge featuring the endangered Atlantic salmon or Atlantic whitefish (see separate sheet included in this package for fish patch designs)
- Complete our quick and easy feedback survey! This will be provided to you through email as the end of fishing season approaches. The feedback surveys will allow CARP to modify the program as needed, and will be an opportunity for anglers to provide feedback on how the first year of the multiyear program went.

If you do not wish to continue participating in the citizen science program after the first year, or wish to switch sites or take on additional grids, please contact the Project Lead, Sam at: samanthahudson@annapolisriver.ca to make these changes.

Fish Patch Incentive

Submit your **angler diaries** at the end of the fishing season and you will receive one of these patches of choice featuring the **endangered** Atlantic salmon (left), **or** the **endangered** Atlantic whitefish (right). *New patch designs for 2021 coming soon.*

Angler diaries can either be mailed to the Clean Annapolis River Project (CARP) *see below* or dropped off at one of the drop off locations provided (see separate drop-off locations sheet).

Clean Annapolis River Project

314 St. George Street, P.O. Box 395,
Annapolis Royal, Nova Scotia, Canada
B0S 1A0

For more information, please contact Sam at samanthahudson@annapolisriver.ca



iNaturalist.org

Be sure to check out our iNaturalist group to be kept in the loop with other anglers participating in the Citizen Science Program, and as a helpful resource for fish identification. If you would like to learn more about iNaturalist, contact Sam at samanthahudson@annapolisriver.ca to learn about possible training opportunities.

CARP Citizen Science iNat link: <https://www.inaturalist.org/projects/carp-volunteer-fish-citizen-science-program>

<https://www.inaturalist.org/pages/what+is+it> (to learn more about iNaturalist)

Important links

Citizen Science Registration:

<https://www.surveymonkey.ca/r/KY7XSYN>

2019 Angler Survey:

<https://www.surveymonkey.ca/r/KY22CRF>

iNaturalist Project page:

<https://www.inaturalist.org/projects/carp-volunteer-fish-citizen-science-program>

CARP website (AIS page):

<https://www.annapolisriver.ca/ais>

Citizen Science Angling Program Page:

<https://www.annapolisriver.ca/citizen-science-program>

2020 NS Angler's Handbook:

<https://novascotia.ca/fish/documents/Anglers-Handbook-2020.pdf>

Other Project Partners

NS Fisheries and Aquaculture:

<https://novascotia.ca/fish>

Fisheries and Oceans Canada:

<https://www.dfo-mpo.gc.ca/>

Mersey Tobeatic Research Institute:

<https://www.merseytobeatic.ca>

Coastal Action Foundation:

<https://www.coastalaction.org/>

Mi'kmaw Conservation Group:

<https://mikmawconservation.ca/>

Appendix 7, AIS fish measuring data sheet

AIS Fish Measurement Data Sheet

Date (dd/mm/yyyy)	Species (CP or SMB)	Water Fished or Grid #	Fork Length (cm)	Girth (cm)	Weight (kg)



Fish Monitoring Program

Weekly Data

Name: _____

Phone: _____ Email: _____

Start Location: DD ° MM MMM N DD ° MM MMM W

End Location: DD ° MM MMM N DD ° MM MMM W

Location Description:

Date	Start Time	End Time	Hours Fished	Total Volunteer Hours	Other Notes
DD/MM/YYYY	: <input type="radio"/> AM <input type="radio"/> PM	: <input type="radio"/> AM <input type="radio"/> PM			
DD/MM/YYYY	: <input type="radio"/> AM <input type="radio"/> PM	: <input type="radio"/> AM <input type="radio"/> PM			
DD/MM/YYYY	: <input type="radio"/> AM <input type="radio"/> PM	: <input type="radio"/> AM <input type="radio"/> PM			
DD/MM/YYYY	: <input type="radio"/> AM <input type="radio"/> PM	: <input type="radio"/> AM <input type="radio"/> PM			
DD/MM/YYYY	: <input type="radio"/> AM <input type="radio"/> PM	: <input type="radio"/> AM <input type="radio"/> PM			
DD/MM/YYYY	: <input type="radio"/> AM <input type="radio"/> PM	: <input type="radio"/> AM <input type="radio"/> PM			
DD/MM/YYYY	: <input type="radio"/> AM <input type="radio"/> PM	: <input type="radio"/> AM <input type="radio"/> PM			

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Appendix 9, Evaluation Survey Results

How did you first hear about CARP's Fish Monitoring Program?	CARP public talk	Word of mouth	Word of mouth	CARP Facebook Page	Word of mouth
Please rate the following aspects of the program with 5 being the highest: [General program organization]	4	5	5	4	4
Please rate the following aspects of the program with 5 being the highest: [Communication with CARP staff]	4	5	5	5	5
Please rate the following aspects of the program with 5 being the highest: [Sign-up procedure]	4	5	4	4	5
Please rate the following aspects of the program with 5 being the highest: [Instructions provided]	4	5	5	5	5
Please rate the following aspects of the program with 5 being the highest: [Materials provided]	4	5	5	5	4

Please rate the following aspects of the program with 5 being the highest: [Relevant training provided]	No comment	5	4	4	4
Did you feel well prepared for your angling surveys?	Yes	Yes	Yes	Yes	Yes
If you did NOT feel well prepared, what additional information or resources could have been provided to you?		Not applicable :)			
Did you complete any angler surveys at your assigned site?	sorry to report that I was busy with other projects last year	Yes	Yes	Yes	Yes
In the future, would you prefer an online form to submit your weekly/daily data sheets, or did you like submitting paper angler diaries at the end of the fishing season?	Online form	Paper copy	Online form	Online form	Online form
Did you join the iNaturalist CARP Volunteer Fish Citizen Science Project?	I did not know about this project page	Yes	Yes	No	Yes

If no, why did you decide to NOT join the iNaturalist project?				I did not want to make an iNaturalist account	
What do you recommend we improve or change for the fish monitoring program in the future?	Mentoring with an experienced angler	Nothing it was awesome !	Keep it up! Lots of fun	Online reporting would be nice, and perhaps the option to have it linked to a map enabling catches from any water body to be entered.	Everything is good I would not change a thing.
What advice would you give to future participants in this volunteer based citizen science program?	Get involved as it is a way to enjoy the outdoors, connect with others and help keep track of invasive species	Remember to take your diary with you !	photograph every observation if possible. It will help you later on when you fill in your sheets	Have fun	Nothing.
Do you have any other comments you would like to share or address?		No	I am excited for next season!		No

Appendix 10, Angler Observations

DATE	OBSERVER	UTMZone	EASTING	NORTHING	CP PRESENCE	SMB PRESENCE	DATA SOURCE	SAMPLING METHOD	YEAR SAMPLED	WATERBODY	WATERSHED
6-Jul-20	Robyn Lohnes	20T	372517	4922936		X	LRSA	Angling	2020	Bruhms Lake	LaHave
6-Jul-20	Robyn Lohnes	20T	372517	4922936	X		LRSA	Angling	2020	Bruhms Lake	LaHave
15-Jul-20	Robyn Lohnes	20T	377888	4916504		X	LRSA	Angling	2020	LaHave River	LaHave
17-Jul-20	Robyn Lohnes	20T	376396	4919740	X		LRSA	Angling	2020	LaHave River	LaHave
17-Jul-20	Robyn Lohnes	20T	376396	4919740		X	LRSA	Angling	2020	LaHave River	LaHave
21-Jul-20	Robyn Lohnes	20T	373660	4921721		X	LRSA	Angling	2020	LaHave River	LaHave
21-Jul-20	Robyn Lohnes	20T	373660	4921721	X		LRSA	Angling	2020	LaHave River	LaHave
24-Jul-20	Robyn Lohnes	20T	371710	4924030		X	LRSA	Angling	2020	LaHave River	LaHave
28-Jul-20	Robyn Lohnes	20T	377888	4916504		X	LRSA	Angling	2020	LaHave River	LaHave
30-Jul-20	Robyn Lohnes	20T	376396	4919740		X	LRSA	Angling	2020	LaHave River	LaHave
4-Aug-20	Robyn Lohnes	20T	373660	4921721		X	LRSA	Angling	2020	LaHave River	LaHave
7-Aug-20	Robyn Lohnes	20T	371710	4924030		X	LRSA	Angling	2020	LaHave River	LaHave
7-Aug-20	Robyn Lohnes	20T	371710	4924030	X		LRSA	Angling	2020	LaHave River	LaHave
14-Aug-20	Robyn Lohnes	20T	373660	4921721		X	LRSA	Angling	2020	LaHave River	LaHave
18-Aug-20	Robyn Lohnes	20T	373660	4921721		X	LRSA	Angling	2020	Bruhms Lake	LaHave
18-Aug-20	Robyn Lohnes	20T	373660	4921721	X		LRSA	Angling	2020	Bruhms Lake	LaHave
21-Aug-20	Robyn Lohnes	20T	370275	4926292	X		LRSA	Angling	2020	Wentzell's Lake	LaHave
21-Aug-20	Robyn Lohnes	20T	370275	4926292		X	LRSA	Angling	2020	Wentzell's Lake	LaHave
		20T	377172	4903150		X	LRSA	Angler Survey	2020	Wallace Lake	Herring Cove/ Meadway
	Sam Reeves	20T	372891	4947463		X	LRSA	Angler Survey	2020	Sherbrook Lake	LaHave
	Sam Reeves	20T	372891	4947463	X		LRSA	Angler Survey	2020	Sherbrook Lake	LaHave
		20T	370275	4926292	X		LRSA	Angler Survey	2020	Wentzell's Lake	LaHave

DATE	OBSERVER	UTMZone	EASTING	NORTHING	CP PRESENCE	SMB PRESENCE	DATA SOURCE	SAMPLING METHOD	YEAR SAMPLED	WATERBODY	WATERSHED
		20T				X	LRSA	Angler Survey	2020	Pleasant River	Herring Cove/ Meadway
		20T	373298	4927394		X	LRSA	Angler Survey	2020	Suckers Lake	Gold
	Sarah Mackenzie	20T	370275	4926292	X		LRSA	Angler Survey	2020	Wentzell's Lake	LaHave
	Sarah Mackenzie	20T	370275	4926292		X	LRSA	Angler Survey	2020	Wentzell's Lake	LaHave
	Sarah Mackenzie	20T	460590	4944288	X		LRSA	Angler Survey	2020	Morris Lake	Sackville
	Sarah Mackenzie	20T	460590	4944288		X	LRSA	Angler Survey	2020	Morris Lake	Sackville
	Sarah Mackenzie	20T	462634	4944704	X		LRSA	Angler Survey	2020	Bissett Lake	Sackville
	Sarah Mackenzie	20T	462634	4944704		X	LRSA	Angler Survey	2020	Bissett Lake	Sackville
	Sarah Mackenzie	20T	460612	4948368	X		LRSA	Angler Survey	2020	Cranberry Lake	Shubenacadie/ Stewiacke
	Sarah Mackenzie	20T	460612	4948368		X	LRSA	Angler Survey	2020	Cranberry Lake	Shubenacadie/ Stewiacke
	Sarah Mackenzie	20T	460111	4949706	X		LRSA	Angler Survey	2020	Loon Lake	Shubenacadie/ Stewiacke
	Sarah Mackenzie	20T	460111	4949706		X	LRSA	Angler Survey	2020	Loon Lake	Shubenacadie/ Stewiacke
	Danny Sabean	20T			X		LRSA	Angler Survey	2020	North Branch Lahave River	LaHave
	Danny Sabean	20T				X	LRSA	Angler Survey	2020	North Branch Lahave River	LaHave
	Daniel Muir	20T	377172	4903150		X	LRSA	Angler Survey	2020	Wallace Lake	Herring Cove/ Meadway
	Mark Whynot	20T	377172	4903150		X	LRSA	Angler Survey	2020	Wallace Lake	Herring Cove/ Meadway
	Ben Eisnor	20T	377172	4903150		X	LRSA	Angler Survey	2020	Wallace Lake	Herring Cove/ Meadway
	Ben Eisnor	20T	382612	4907771		X	LRSA	Angler Survey	2020	Pernette Lake	LaHave
	MCG	20T	477407	4999727	X		MCG	eDNA	2020	South Branch Stewiack River	Shubenacadie/ Stewiacke
	MCG	20T	489569	5015653	X		MCG	eDNA	2020	Rutherford Brook	Shubenacadie/ Stewiacke
	MCG	20T	474174	5009669	X		MCG	eDNA	2020	Shorrts Lake	Shubenacadie/ Stewiacke
	Kyle Hicks	20T				X	NSP		2020	Roseway River	Roseway/ Sable/Jordan
31-Aug-20	Sam Hudson	20T	338948	4968070		X	CARP	eDNA	2020	Nictaux River	Annapolis River
28-Aug-20	Sam Hudson	20T	317258	4953970		X	CARP	Angling	2020	Gibson's Lake	Annapolis River
28-Aug-20	Sam Hudson	20T	326469	4958250		X	CARP	Angling	2020	Paradise Lake	Annapolis River

DATE	OBSERVER	UTMZone	EASTING	NORTHING	CP PRESENCE	SMB PRESENCE	DATA SOURCE	SAMPLING METHOD	YEAR SAMPLED	WATERBODY	WATERSHED
28-Aug-20	Sam Hudson	20T	306780	4953195		X	CARP	Angling	2020	Lake La Rose	Annapolis River
		20T				X	CARP	Angler Survey	2020	Nictaux Canal	Annapolis River
		20T	441837	4962234		X	CARP	Angler Survey	2020	Springfield Lake	Shubenacadie/Stewiacke
		20T	341415	4950291		X	CARP	Angler Survey	2020	McGill Lake	Annapolis River
		20T	327528	4978739		X	CARP	Angler Survey	2020	Elliot Lake	Annapolis River
		20T	320502	4973804		X	CARP	Angler Survey	2020	Rumsey Lake	Annapolis River
	Glenny Mercer	20T	368870	4976937		X	CARP	Angler Survey	2020	Aylesford Lake	Gaspereau
	Glenny Mercer	20T	366354	4976445		X	CARP	Angler Survey	2020	Lake George	Gaspereau
	Glenny Mercer	20T	338948	4968070		X	CARP	Angler Survey	2020	Wambolt Falls	Annapolis River
		20T	304298	4945689		X	CARP	Angler Survey	2020	Grand Lake	Annapolis River
	Jeff Hafting	20T	304298	4945689		X	CARP	Angler Survey	2020	Grand Lake	Annapolis River

Volunteer Angler Aquatic Invasive Species Monitoring Pilot Program			
Financial Statement to March 31, 2021	Details	Budget	Actual
Revenue - NS Fisheries and Aquaculture		5,000.00	5,000.00
Expenses			
Human Resources: Project Manger	18 days @ \$250/day	2,300.00	4,500.00
Randy Fredericks GIS Contractor	GIS mapping contractor fee	2,700.00	500.00
Materials and Supplies			-
Mileage			-
Overhead			-
Total Expenses		5,000.00	5,000.00
Project Matching Contributions:			
CASH: DFO HSP Aquatic Species at Risk	Allocation of Project Leader wage	5,748.00	5,748.00
InKind Project support	See Partner list below	3,750.00	11,500.00
TOTAL Project Match		9,498.00	11,500.00
Partner In Kind Contributions:			
LaHave Salmon Association			
Technical Support from Robyn Lohnes, Carroll Randall	3 days @ \$500/day	1,500.00	
Angler surveys, EYI virtual video, sign installation, Education and outreach, AIS field sampling	10 days @ \$500/day	5,000.00	
Jijuktu'kwek Water Alliance - Colton Keeler			
Delivering angler surveys; angling and recording species caught on the Cornwallis River and other watersheds; collecting specific species for eDNA primer collection; updating Excel sheet for fish observation, Inaturalist uploads, meetings and communication	10 days @ \$500/day	5,000.00	
	Contributions	11,500.00	

Susan Lane

From: Levi Cliche <levicliche@annapolisriver.ca>
Sent: December 8, 2020 11:34 AM
To: 'Susan Lane'
Subject: Payment to Randy Fredericks for GIS Mapping services

Hi Sue,

Can you please make out a cheque in the amount of \$500 payable to Randy Fredericks for GIS mapping services rendered to CARP related to the Freshwater Fisheries Research Partnership funded project: Volunteer Angler Aquatic Invasive Species Monitoring Pilot Program.

Thanks,

Levi


Levi Cliche
Executive Director
Clean Annapolis River Project

314 St. George Street
PO Box 395
Annapolis Royal, NS
B0S 1A0

P: 902-532-7533 ext.2
C: 902-308-2670

ACCOUNT ALLOCATION	
TOTAL INVOICE \$	<u>500.-</u>
GL# 5710	AMT
<u>NS Fresh Water Fisheries</u>	<u>500.-</u>



 Virus-free. www.avast.com

PAID Amount \$ 500.00
Date Dec 9 / 20 Chq # 11732

Clean Annapolis River Project									
Employee Detail 01/04/2020 to 11/02/2021									
	Date	Cheque No.	Gross	Withheld	Net Pay	EI	CPP	Tax	Workers Comp
Samantha Hudson									
	17-04-2020	11462	1,237.60	244.09	993.51	19.55	57.91	166.63	5.45
	01-05-2020	11482	1,237.60	244.09	993.51	19.55	57.91	166.63	5.45
	15-05-2020	11497	1,237.60	244.09	993.51	19.55	57.91	166.63	5.45
	27-05-2020	11503	1,390.56	297.86	1,092.70	21.97	65.94	209.95	6.12
	12-06-2020	11524	1,274.73	257.14	1,017.59	20.14	59.86	177.14	5.61
	26-06-2020	11535	1,274.73	257.14	1,017.59	20.14	59.86	177.14	5.61
	10-07-2020	11543	1,274.73	257.14	1,017.59	20.14	59.86	177.14	5.61
	24-07-2020	11561	1,274.73	257.14	1,017.59	20.14	59.86	177.14	5.61
	07-08-2020	11577	1,274.73	257.14	1,017.59	20.14	59.86	177.14	5.61
	21-08-2020	11588	1,274.73	257.14	1,017.59	20.14	59.86	177.14	5.61
	04-09-2020	11607	1,274.73	257.14	1,017.59	20.14	59.86	177.14	5.61
	18-09-2020	11619	1,274.73	257.14	1,017.59	20.14	59.86	177.14	5.61
	02-10-2020	11632	637.36	63.92	573.44	10.07	26.39	27.46	2.81
		Total	15,938.56	3,151.17	12,787.39	251.81	744.94	2,154.42	70.16
		MERC	1167.63			352.53	744.94		
			17,106.19						
	Allocation of wages for Citizen Science Program @ 34%		5,748.00						